

TAD08 – (A9 Notes) HL Further NMR Notes

Name

1. A.9.1 Explain the use of tetramethylsilane (TMS) as the reference standard. (3)

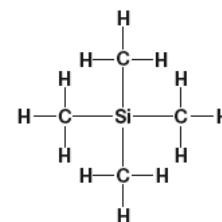


Figure 21.132 Structure of tetramethylsilane (TMS)

2. A.9.2 Analyze ^1H NMR spectra. (3)

- a. Students should be able to interpret the following from ^1H NMR spectra: number of peaks, area under each peak, chemical shift and splitting patterns. Treatment of spin-spin coupling constants will not be assessed, but students should be familiar with singlets, doublets, triplets and quartets.
- b. Explain the spin-spin splitting pattern:

Adjacent C Hydrogens	Pascals Triangle	Multiplicity

- c. Identify the Multiplicity for each set of peaks. Be sure to identify (circle) the source from the compound

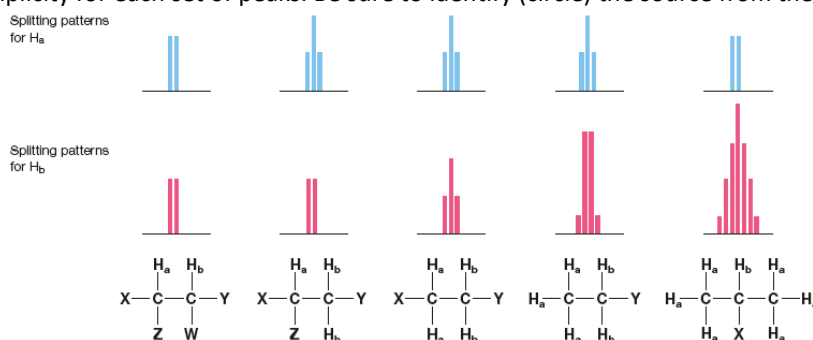
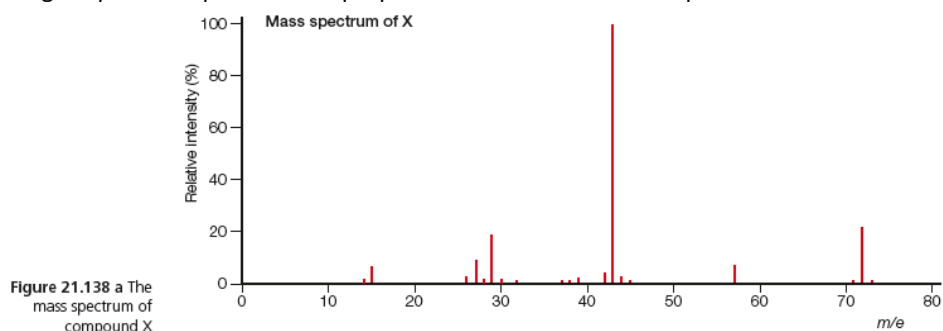


Figure 21.133 Commonly observed splitting patterns

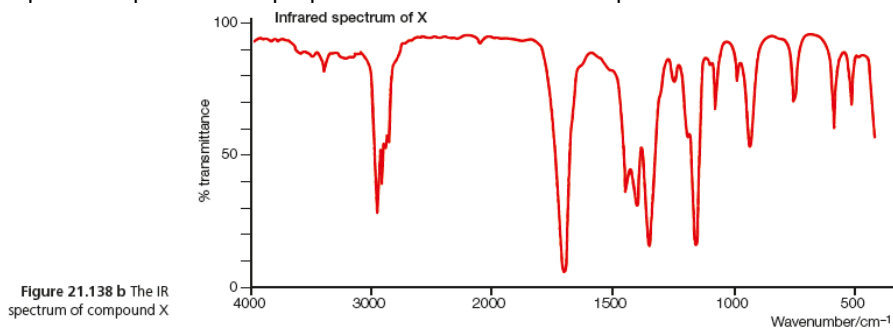
- d. Using Multiple Techniques: Determine the structural formula of "Compound X" using the following techniques:
- Briefly Identify what each technique can tell you about a substance, and how the sample is treated
 - Elemental Analyzer
 - Mass Spectrometry
 - IR Spectrometry
 - NMR Spectrometry

- ii. EA: The combustion of 100.0 g of compound $C_xH_yO_z$ produced 244.31g carbon dioxide and 99.01g water:

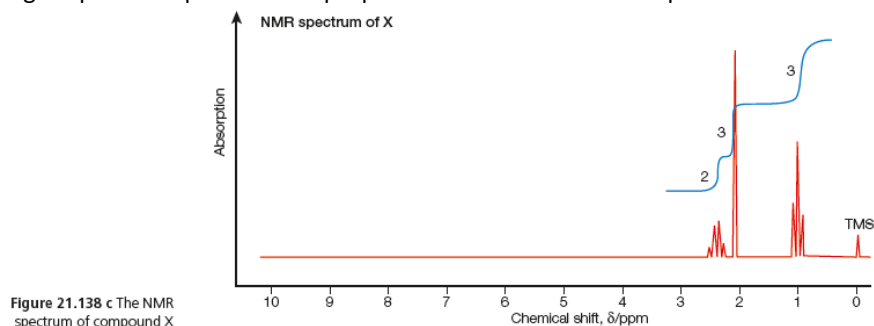
- iii. MS: Using the following output to help determine properties of the unknown compound:



- iv. IR: Using the following output to help determine properties of the unknown compound:



- v. 1H NMR: Using the following output to help determine properties of the unknown compound:



- vi. Determine the structural formula of the unknown hydrocarbon: